

WHAT IS CLAIMED IS:

- 1                   1.       A network system, comprising:  
2                   a plurality of integrated access devices (IADs) assigned to a plurality of  
3 clients in a multi-client unit (MCU), at least one IAD being assigned to each of the  
4 plurality of clients in the multi-client unit to transmit and receive units of information, the  
5 IADs being configured to prioritize data transmission according to the type of information  
6 included in the units of information;  
7                   an MCU gateway device assigned to the multi-client unit and coupled to  
8 the plurality of IADs to receive or transmit the units of information, the gateway device  
9 being configured to prioritize the units of information according to the type of  
10 information included in the units of information; and  
11                  a regional switching device assigned to a geographic region including the  
12 MCU, the regional switching device being coupled to the gateway device to transmit or  
13 receive the units of information to and from the gateway device, wherein the unit of  
14 information is any block of data suitable for transmission from a first node to a second  
15 node in the network system.
- 1                   2.       The network system of claim 1, wherein the IADs are coupled to  
2 customer premise equipment.
- 1                   3.       The network system of claim 1, wherein at least one IADs is  
2 coupled to an Ethernet or local area network system and a plurality of telephones.
- 1                   4.       The network system of claim 3, wherein at least one client includes  
2 a plurality of users.
- 1                   5.       The network system of claim 4, wherein at least one IAD is  
2 provided within the client's premise.
- 1                   6.       The network system of claim 1, wherein the units of information  
2 include cells, packets, segments, or a combination thereof.
- 1                   7.       The network system of claim 1, wherein the regional switching  
2 device is a wide area network link terminator or an add-drop multiplexer.

1                   8.     The network system of claim 1, wherein the gateway device is  
2 provided within the MCU.

1                   9.     The network system of claim 8, wherein the MCU is one selected  
2 from the group consisting of: a building including a plurality of tenants, a business  
3 complex, an apartment complex, an educational institution, and a plurality of buildings  
4 provided within a close proximity from each other.

1                   10.    The network system of claim 1, wherein the gateway device  
2 includes:  
3                   at least one wide area network (WAN) card to interface with the regional  
4 switching device;  
5                   at least one line card to interface with the plurality of IADs; and  
6                   at least one switch card to receive and transmit the units of information to  
7 and from the line card and the WAN card.

1                   11.    The network system of claim 10, wherein a new transmission  
2 technology can be implemented by upgrading the WAN card without making a  
3 corresponding upgrade on the IADs.

1                   12.    The network system of claim 10, wherein the gateway device  
2 includes a plurality of WAN cards, a plurality of switch cards, and a plurality of line  
3 cards.

1                   13.    The network system of claim 12, wherein the plurality of WAN  
2 cards includes:  
3                   a first WAN card dedicated to units of information transmitted under a first  
4 technology; and  
5                   a second WAN card dedicated to units of information transmitted under a  
6 second technology.

1                   14.    The network system of claim 12, wherein the plurality of WAN  
2 cards, the plurality of switch cards, and the plurality of line cards provide redundancy, so  
3 that data transmission can continue without interruption even when one or more of the  
4 WAN cards, switch cards, or line cards experience device failure or are placed out of  
5 service.

1           15.     The network system of claim 1, wherein the units of information  
2 include voice units including voice information, video units including video information,  
3 and data units including non-voice and non-video information.

1           16.     The network system of claim 15, wherein the voice units includes  
2 two or more of the following: voice packets transmitted under a voice-over-TCP/IP  
3 protocol, voice cells transmitted under a voice-over-ATM protocol, and voice packets  
4 transmitted under a voice-over-TDM protocol.

1           17.     The network system of claim 15, wherein, for each client, the voice  
2 units, video units, and data units are provided with maximum and minimum data  
3 transmission rates respectively, wherein the IAD corresponding the the client guarantees  
4 the respective minimum data rates for the voice, video, and data units, and regulates the  
5 voice, video, and data units from exceeding the respective maximum data rates.

1           18.     The network system of claim 17, wherein the gateway device  
2 guarantees the respective minimum data rates for the voice, video, and data units, and  
3 regulates the voice, video, and data units from exceeding the respective maximum data  
4 rates.

1           19.     The network system of claim 15, wherein the data units includes a  
2 plurality of data classes to classify the data units according to the type of data contained  
3 therein.

1           20.     The network system of claim 19, wherein the data units are  
2 prioritized for data transmission according to the data classes to which the data units are  
3 classified.

1           21.     The network system of claim 20, wherein the plurality of data  
2 classes are classified into four different levels of priority: very high priority, high priority,  
3 medium priority, and low priority.

1           22.     The network system of claim 1, wherein the MCU includes one or  
2 more clients that are not assigned the IADs.

1           23.     A network system, comprising:

at least first and second integrated access devices (IADs) assigned to a plurality of clients, respectively, in a multi-client unit (MCU) to transmit and receive units of information, the IADs being configured to regulate data transmission according to the type of information included in the units of information and first maximum and first minimum data rates assigned to the respective clients, the units of information including voice units containing voice information, video units containing video information, and data units containing non-voice and non-video information;

an MCU gateway device assigned to the multi-client unit and coupled to the IADs to receive or transmit the units of information, the gateway device being configured to regulate data transmission according to the type of information included in the units of information and second maximum and second minimum data rates assigned to the respective clients; and

a regional switching device assigned to a geographic region including the MCU, the regional switching device being coupled to the gateway device to transmit or receive the units of information to and from the gateway device, wherein the unit of information is any block of data suitable for transmission from a first node to a second node in the network system.

24. The network system of claim 23, wherein the clients are provided with first and second average data rates, the first and second average data rates being used to regulate data transmission in the IADs and gateway device, respectively.

25. The network system of claim 23, wherein the first maximum and first minimum data rates and the second maximum and second minimum data rates are the same.

26. The network system of claim 25, wherein the first and second maximum and minimum data rates define maximum and minimum data transmission rates assigned to the clients for all units of information including voice, video and data units.

27. The network system of claim 25, wherein the first maximum and minimum data rates define maximum and minimum data transmission rates assigned to the clients for the voice units, video units, or data units.

1                   28.     The network system of claim 23, wherein the first maximum and  
2     first minimum data rates and the second maximum and second minimum data rates are  
3     different.

1                   29.     The network system of claim 23, wherein the units of information  
2     includes voice units containing voice information, video units containing video  
3     information, and data units containing non-voice and non-video information, wherein the  
4     voice units and video units are given priority over the data units during data transmission  
5     in the IAD and gateway device.

1                   30.     The network system of claim 29, wherein the data units separated  
2     into different different levels of priority according to the types of information included in  
3     the data units, the data units with a higher priority level being given priority over the data  
4     units with a lower priority level during data transmission in the IAD or gateway device.

1                   31.     The network system of claim 23, wherein the units of information  
2     separated into a plurality of classes according to the type of information included in the  
3     units of information, wherein the plurality of classes correspond to a plurality of priority  
4     levels.

1                   32.     A network system, comprising:  
2                   a building having a plurality of tenants;  
3                   a switching device provided at a location remote from the building;  
4                   a plurality of integrated access devices (IADs) assigned to a plurality of  
5     tenants in the building to transmit and receive units of information, the IADs being  
6     configured to regulate data transmission according to the type of information included in  
7     the units of information and first maximum and first minimum data rates assigned to the  
8     respective clients, the units of information including voice units containing voice  
9     information, video units containing video information, and data units containing non-  
10    voice and non-video information; and  
11                  a gateway device dedicated to the building and coupled to the plurality of  
12    IADs to receive or transmit the units of information, the gateway device being configured  
13    to regulate data transmission according to the type of information included in the units of  
14    information and second maximum and second minimum data rates assigned to the  
15    respective clients, wherein the gateway device is configured to have a particular amount

16 of bandwidth in communicating information with the switching device, the amount of  
17 bandwidth being shared by the plurality of IADs to communicate information with the  
18 switching device, wherein the unit of information is any block of data suitable for  
19 transmission from a first node to a second node in the network system.

1 33. The network system of claim 32, wherein the second maximum  
2 data rate is the maximum bandwidth allocated to a particular client, and the second  
3 minimum data rate is the minimum bandwidth allocated to the particular client.

1 34. The network system of claim 33, wherein different clients have  
2 different second maximum and minimum data rates.

1 35. A building area network system, comprising:.  
2 a gateway device provided within a multi-tenant unit or within a close  
3 proximity thereto, each of the tenants in the multi-tenant units having a plurality of users,  
4 the gateway device dividing the available bandwidth among the tenants within the multi-  
5 client unit;  
6 a tenant policy management device coupled to the gateway device, the  
7 tenant policy management device being adapted to regulate inward-bound data and  
8 outward-bound data of each of the tenants; and  
9 a plurality of access devices each assigned to one of the tenants, each of  
10 the access devices coupled to the gateway device and coupled to one or more customer  
11 premise equipment, each of the access devices being adapted to regulate a portion of the  
12 inward-bound data and outward-bound data for the tenant to which the integrated access  
13 device is assigned.

1 36. The network system of claim 35, wherein the gateway device  
2 includes a traffic shaper to prioritize packets for data transmission purposes.

1 37. The network system of claim 35, wherein the inward and outward  
2 data between the gateway device and each access devices are in a VDSL format.

1 38. The network system of claim 35, wherein each of the access  
2 devices provides an IP routing service.

1 39. The network system of claim 35, wherein each of the access  
2 devices provides an IP security service.

1                   40.     The network system of claim 35, wherein each of the access  
2 devices provides an IP management service.

1                   41.     The network system of claim 35, wherein the customer premises  
2 equipment is selected from analog phones, PBX, computers, workstations, fax machines,  
3 routers, switches, and servers.

1                   42.     The network system of claim 35, wherein the tenants includes at  
2 least 10 tenants.

1                   43.     The network system of claim 36, wherein the gateway device  
2 comprises a form factor of an area of less than two by two by two feet in length, width,  
3 and height.

1                   44.     The network system of claim 37, wherein each of the access  
2 devices comprises a user policy manager, the user policy manager being adapted to  
3 oversee an inflow and outflow of data between each of the users and the gateway device.

1                   45.     A method for transporting and distribution of information in a  
2 building area network, the method comprising:  
3                   providing a source of information, the source of information including  
4 communication information for more than one tenant, the communication information for  
5 each of the tenants being at a selected data rate, each of the tenants including a plurality  
6 of users;  
7                   determining if the selected data rate for the tenant is within a set of  
8 predetermined limits defined for the tenant;  
9                   if the selected data rate for the tenant is within the predetermined limits,  
10 initiating a policy management process;  
11                  determining a priority decision for the communication information for the  
12 tenant using the policy management process;  
13                  enforcing the priority decision for the communication information; and  
14                  processing the communication information based upon the enforcement  
15 step to one of the tenants.

1                   46.     The method of claim 45 wherein the communication information  
2 comprises voice and data information.

1                   47.     The method of claim 45 wherein the communication information  
2 during the transferring is in a VDSL format.

1                   48.     The method of claim 45 wherein the predetermined limits are  
2 selected from a minimum data rate, a sustained data rate, a peak data rate, and a burst  
3 limit of the data rate.

1                   49.     The method of claim 45 wherein the processing is selected from  
2 operations including a discard, a transfer, or marked for transferring later if needed.

1                   50.     The method of claim 45 wherein the processing comprises  
2 temporarily storing the communication information into a memory before the  
3 communication information is transferred based upon the priority decision.

1                   51.     The method of claim 50 wherein the priority decision is based upon  
2 a priority tag and a policy.

1                   52.     The method of claim 45 wherein the steps are provided in a  
2 gateway device.

1                   53.     The method of claim 45 the communication information after the  
2 process is transferred to an access device.

1                   54.     A system for transporting and distribution of information in a  
2 building area network, the system coupled to a source of information, the source of  
3 information including communication information for more than one tenant, the  
4 communication information for each of the tenants being at a selected data rate, each of  
5 the tenants including a plurality of users, the system also including one or more  
6 memories, the one or more memories comprising:

7                   a code directed to determining if the selected data rate for the tenant is  
8 within a set of predetermined limits defined for the tenant;

9                   a code directed to initiating a policy management process if the selected  
10 data rate for the tenant is within the predetermined limits;

11                  a code directed to determining a priority decision for the communication  
12 information for the tenant using the policy management process;



- 13                    a code directed to enforcing the priority decision for the communication  
14    information; and
- 15                    a code directed to processing the communication information based upon  
16    the enforcement step to one of the tenants.